

## In search of Korotkoff

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The influence of medical history on contemporary practitioners and on the course of medicine is as variable and subtle as it is contentious and ineluctable. Nonetheless, for most doctors there comes a time—especially in medical research—when they are drawn back to the pioneers of their specialty. Invariably they return enriched and refreshed from this temporal odyssey. How often one embarks on the journey in the naive belief that the terrain is unexplored, and how frequently this possessive zealotry gives way to mixed feelings of disappointment that so many others had travelled the same path, and relief that there is so much material to facilitate one's researches. There are, of course, exceptions but usually these are confined to the minor figures of medicine. Who would have thought that Korotkoff, a household name in clinical medicine, could have been neglected by medical historians? He is not even mentioned in Major's *Classic Descriptions of Disease*<sup>1</sup>; Willius and Keys ignore him in *Cardiac Classics*<sup>2</sup>; and he fails to join the ranks of the great in Willius and Dry's *History of the Heart and Circulation*.<sup>3</sup> Specialised books on blood pressure contain scant information on the man, although Lewis,<sup>4</sup> Ruskin,<sup>5</sup> and Pickering<sup>6</sup> attempted to redress the imbalance by publishing translations of his original paper from the Russian.

### Quest for Korotkoff

Nicolai Korotkoff has, nonetheless, had one staunch champion. Harold Segall took up the cause back in 1939, and a series of interesting papers have appeared over the years.<sup>7-9</sup> The first published photograph of Korotkoff appeared only in 1970<sup>10</sup> and Segall produced another in 1976.<sup>9</sup> These few papers provide us with the mere bones of biography; there is certainly no flesh,

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and hardly any sign of personality. Our own search for Korotkoff the man as well as the scientist brought us into a correspondence with Segall that provided tantalising pieces of information with the promise of better to come. Then in August 1980 we received one of a privately printed issue of the first translation of Korotkoff's thesis<sup>11</sup> and of even greater delight to us the edition included several unique photographs and a preface with biographical notes by Segall. The tortuous and prolonged research that makes this book so fascinating brings to mind *The*



Dr N S Korotkoff.

*Quest for Corvo*,<sup>12</sup> with the difference that the quest for Korotkoff is not by any means complete. A review of the facts available may stimulate others—perhaps in Russia—to unearth more details about this enigmatic surgeon.

Nicolai Sergeivich Korotkoff was born to a merchant family of Orthodox faith at 40 Milenskaya (now Sovetskaya) Street in Kursk on 13 February 1874. He attended the Kursk Gymnasium (secondary school), where he received excellent marks for behaviour and diligence but was found wanting in “divine law.”<sup>13</sup> He entered the medical faculty of Kharkov University in 1893 and transferred to Moscow University in 1895, where he graduated with distinction in 1898 at the age of 24. He was appointed resident intern to Professor A A Bobrov at the

surgical clinic of Moscow University. He is remembered as a tall, slender, studious young man,<sup>11</sup> and his son recalls that his father attached great importance to the development of will power through rigid self-discipline. On one occasion he almost took things too far when he plunged into the freezing waters of a river to test his determination, and became seriously ill from pneumonia.<sup>12</sup>

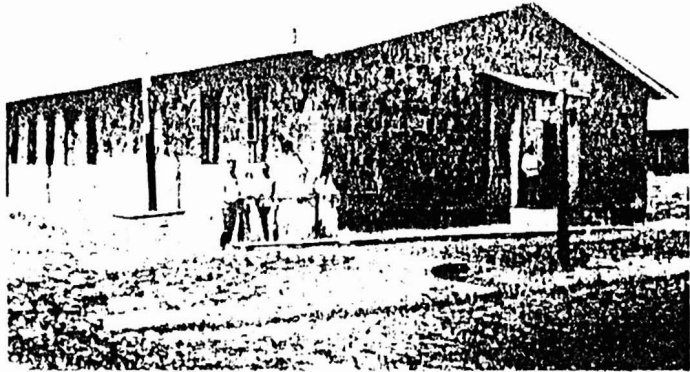
Korotkoff was given leave of absence to serve with the Russian military forces in the Far East during the Boxer Rebellion in China in 1900. He was attached to the Red Cross in the Iversh Community under Dr Aleksinskii, a former pupil of Professor Babrov. The journey to the Far East entailed extensive travel by way of the Trans-Siberian railroad, through Irkutsk across Lake Baikal to Vladivostock, and he returned to Moscow via Japan, Singapore, Ceylon, and the Suez Canal to reach the Black Sea and Foedusia. He was honoured with the Order of St Anna for "outstandingly zealous labours in helping the sick and wounded soldiers."<sup>13</sup>

On his return Korotkoff turned his mind from military to academic pursuits and translated Albert's monograph *Die Chirurgische Diagnostik* from German to Russian. In 1903, Dr Serge P Federov, an older colleague, was appointed professor of surgery at the Military Medical Academy at St Petersburg, and he invited Korotkoff to join him as assistant surgeon. In 1903 Korotkoff took the first of several examinations for a doctorate of medicine.

It was not long, however, before war again interrupted his studies. During the Russo-Japanese War in 1904-5, he went to Harbin in Manchuria as senior surgeon in charge of the



Personnel of the Second Hospital of the St George Red Cross Society photographed in St Petersburg (Leningrad) in May 1904 before departure to the Far East to serve in the Russo-Japanese War. Korotkoff, senior physician, is in the second row, fifth from the left, wearing a bowler hat. Mrs Korotkoff is seated in the front row, third from the right.



Exterior of building in which the Second Hospital of the St George Red Cross Society was lodged in August 1904 at Harbin, Manchuria.

Second St George's Unit of the Red Cross. He became interested in vascular surgery and began to collect cases for his doctoral thesis, which was to include 41 reports of patients he had treated during his stay at Harbin.

#### **Korotkoff's writings**

Returning to St Petersburg in April 1905 he began to prepare his thesis, but it was a presentation to the Imperial Military Academy in 1905 that earned him lasting fame; the technique of blood pressure measurement was reported in less than a page of the *Reports of the Imperial Military Medical Academy* of St Petersburg.<sup>14</sup>

"The cuff of Riva-Rocci is placed on the middle third of the upper arm; the pressure within the cuff is quickly raised up to complete cessation of circulation below the cuff. Then, letting the mercury of the manometer fall one listens to the artery just below the cuff with a children's stethoscope. At first no sounds are heard. With the falling of the mercury in the manometer down to a certain height, the first short tones appear; their appearance indicates the passage of part of the pulse wave under the cuff. It follows that the manometric figure at which the first tone appears corresponds to the maximal pressure. With the further fall of the mercury in the manometer one hears the systolic compression murmurs, which pass again into tones (second). Finally, all sounds disappear. The time of the cessation of sounds indicates the free passage of the pulsewave; in other words, at the moment of the disappearance of the sounds the minimal blood pressure within the artery predominates over the pressure in the cuff. It follows that the manometric figures at this time correspond to the minimal blood pressure."

The critical comments of Korotkoff's peers were dealt with in an adroit manner, and he appeared a month later at the Imperial Military Academy with animal experiments to support his theory that the sounds he had described were produced locally rather than in the heart.<sup>15</sup> He earned the approbation of Professor M V Yanovski, who declared: "Korotkoff has noticed and intelligently utilised a phenomenon which many observers have overlooked." These two brief communications are of greater interest to us than his thesis which he successfully defended in 1910.<sup>16</sup> Although he does refer to his technique of blood pressure measurement in the thesis he does not describe it in any detail. In fact, were it not for Yanovski who saw the potential value in Korotkoff's technique the auscultatory method of blood pressure measurement might have languished in obscurity. William Dock has taken this line of thought a little further, "The most remarkable fact about the Korotkoff sound is that it was discovered."<sup>17</sup> Yanovski and his pupils verified the accuracy of the technique and described the phases of the auscultatory sounds. Yanovski was to Korotkoff as Samuel Wilks had been to Thomas Hodgkin, and for a time the technique was known as the Korotkoff-Yanovski Method.<sup>18</sup>

#### **What prevented his academic development?**

These three communications appear to be the sum of Korotkoff's contribution to scientific publications. In 1908 we find him serving as research physician to the mining district of Vitimsko-Olekminsky in Siberia. After receiving his doctorate he served as surgeon to the workers of the gold mines of Lensk. Here he witnessed some Tsarist atrocities, and was affected deeply by the murder of unarmed striking miners. After this he returned to St Petersburg and during the first world war he was surgeon to "The Charitable House for disabled soldiers" in Tsarskoe Selo. He welcomed the October Revolution after which he was physician-in-chief of the Metchnikov Hospital in Leningrad until his death in 1920 at the young age of 46.<sup>19</sup> His wife outlived him by 20 years and died in the siege of Leningrad in December 1941.<sup>21</sup>

From these meagre facts some interesting questions arise. Firstly, did Korotkoff appreciate the importance of his discovery, and if he did was he not recalcitrant in failing to develop and apply the technique in clinical medicine? A study of Korotkoff's thesis shows that he had a keen intelligent mind with a researcher's appreciation of the value of a new technique, and even if we accept that initially he may not have appreciated fully the clinical application of his technique, he would certainly have become aware of it within the next decade as interest in blood pressure became international.

This brings us to the next question. Were circumstances, either personal or political, such that Korotkoff never had the opportunity to develop his discovery and indeed his scientific

potential to the full? There are suggestions that this may have been so. He had shown, it would seem, sufficient academic promise to pursue a hospital career in St Petersburg or Moscow. He had translated Albert's monograph on diagnostic surgery two years after qualifying; he had presented his technique of blood pressure measurement when aged 31, and Fedorov had recognised his talent by inviting him to join his staff in 1903. What then prevented his academic development? It is possible that the criticism he received initially from his senior colleagues may have driven him from academe, but he appears to have been a match for his peers. Was it an interest in travel, or a desire to alleviate suffering, or merely circumstances that brought him to serve with the Red Cross units in the Boxer Rebellion in China and in the Russo-Japanese war in Manchuria? What was it that brought him to the mining district of Siberia, to the gold mines of Lensk, and to the "Charitable House for disabled soldiers."?

His wife also served in the Red Cross and accompanied him to Manchuria as a nurse. Perhaps we would not be wrong



Mrs Korotkoff, who died during the siege of Leningrad in December 1941.

in scenting an aroma of kindly altruism in the Korotkoff household. This might account for Nicolai Korotkoff's apparent lack of interest in furthering his unique discovery. Indeed, it has been emphasised that one of the outstanding features of his personality was an intense "modesty." Perhaps this is not quite the right word, but to this characteristic has been attributed his rejection of an academic career and his refusal to develop, not



Interior of the Second Hospital of the St George Red Cross Society in 1904.

to mind exploit, his scientific publications.<sup>13</sup> Alternatively, his political beliefs possibly brought him into disfavour with the medical or political establishment. After all it is suggested that he left Lensk to return to St Petersburg after witnessing the murder of the striking miners. We are left wondering why.

Harold Segall in the course of his researches managed with the help of many friends to trace the son of Nicolai Korotkoff, Dr Serge Korotkoff, who specialises in "sports medicine and rehabilitation with physical exercise."<sup>14</sup> It is heartening to learn that he is writing a biography of his famous father and an account of the evolution of the use of his father's technique. Dr Segall has happily undertaken to have the work translated into English, an event that will be an important landmark in the history of medicine. At the end of the day will Nicolai Korotkoff prove to be as fascinating as he is now enigmatic? It seems possible that he may.

This essay is based on the researches of Dr Harold Segall and especially on his illustrated monograph on Korotkoff. We thank him for his generosity in providing us with much biographical detail and advice; in particular, we wish to express our gratitude to him for providing us with the illustrations for this paper.

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